Remarks

The office action of July 21, 2009 has been carefully reviewed. In response to this office action, claims 24 and 27 have been amended. Claims 24, 26-29, and 31-34 are currently pending and presented for review. Favorable reconsideration and allowance are respectfully requested in light of the remarks which follow.

Claim Rejections – 35 U.S.C. § 103

Claims 24, 26-29, and 31-34 have been rejected under 35 U.S.C. § 103(a) as being unpatentable over Smith et al., International Publication No. WO 98/42101 (herein "Smith") in view of Zweben et al., U.S. Patent No. 6,216,109 (herein "Zweben"). Applicant submits that amended claims 24 and 27 patentably define over Smith in view of Zweben.

Before addressing the merits of the rejection, Applicant wishes to highlight some of the unique challenges associated with industrial controllers as outlined in the Background of the present Application. Industrial controllers are special purpose controllers for controlling industrial processes or manufacturing equipment, see para. [0003]. The process, and consequently control hardware, may be distributed at locations throughout a factory, see para. [006]. Consequently, the control application may need to receive input and/or output data or execute portions of the control program on spatially separated, control hardware nodes. By executing on spatially separated nodes, the control hardware necessarily requires communication between the nodes and introduces the potential of communication delays in a control process, see para. [0008].

Reliable operation of the control program is critical for continued execution of the controlled process. Reliable operation of the control program demands deterministic performance, meaning the program executes at known and repeatable time intervals, see para. [0007]. Consequently, the real-time operating system must ensure that each application executing on the distributed control system can access the physical resources required for the application and execute within a specific time interval, see para. [007].

Claim 24

The combination of Smith and Zweben fail to teach or suggest at least the following limitations from claim 24: "managing at least one resource from at least a first and a second, spatially separated control hardware node with the real-time operating system" and "matching control hardware resources required by the new control application program from a resource list to resources on at least the first and the second spatially separated control hardware nodes." Specifically, these limitations require that a real-time operating system manage resources from two separate control hardware nodes and that the resources required by the new application are similarly located on two separate control hardware nodes.

Smith fails to disclose a real-time operating system managing at least one resource from at least a first and a second, spatially separated control hardware node. First, Smith fails to disclose a real-time operating system managing resources on two separate nodes. The resource agent 25 is an application executing on a participating terminal 20 and is duplicated for each participating terminal 20. Each terminal 20 has a unique copy of the resource agent 25 executing on the terminal 20 to manage the resources of that individual terminal 20. (see Fig. 3, and page 16, lines 14-16). The configuration engine 26 contains a list of resources required by an application to run. (see page 17, lines 2-5). A comparison is performed between the list of resources in the configuration engine 26 and the resources available on the terminal 20 to determine the best configuration for the terminal 20 to run the application. After performing the comparison, the resource agent 25 reserves the resources required to execute the application on the terminal 20. Therefore, Smith discloses individual resource agents 25 managing the resources of the individual terminals 20 to provide the streaming media on that particular terminal 20. In contrast, the present claims require a real-time operating system which manages resources from at least two spatially separated nodes and which matches the resources required by an application to a list of resources on at least two spatially separated nodes.

The combination of Smith and Zweben also fail to teach or suggest the limitations of "identifying a fixed time interval associated with the new control application program

for completing execution of at least a portion of the new control application program" and "determining whether the allocated portions of the new control application program can be executed within the portion of the fixed time interval allocated to each identified control hardware resource while requirements of the other control application programs also are met." The above-identified limitations require that a new control application program being registered with the real-time operating system be completed within a fixed time interval and, further, that the new program can execute without interfering with the existing applications.

Both Smith and Zweben fail to disclose the deterministic execution required by the above-identified claim limitations and an industrial control system. Smith discloses a completion time constraint according to the ability of a user to define a time of day during which the service may be provided. Smith does not require any portion of the networking application to be completed within the time interval defined by the user. In contrast, the time interval defined by the user in Smith only permits the application to execute during some portion of the day. The application may or may not run during that time, and further, the application may start running but not complete during the allocated time. Second, the time interval defined by the user as disclosed by Smith is associated with a terminal and not with the control application program.

Similarly, Zweben discloses defining a time limitation during which a task can be performed (col. 16, lines 39-57). Zweben again does not require the task to performed during the defined time (see col. 17, lines 5-11 and col. 18, line 4). Zweben assigns a penalty if a particular scheduling constraint is not met, such as the defined time. However, each constraint violation need not be repaired. (col. 18, line 4). The method in Zweben attempts to iteratively reduce the number of constraint violations; however, other constraints, for example eliminating overtime, may be more important than meeting a due date. The iterative scheduling software will attempt to minimize the number of constraint violations, but does not guarantee the deterministic scheduling as required by an industrial controlled process.

Claim 27

Claim 27 has been amended to require similar limitations as those referenced above with respect to claim 24. These limitations are neither taught nor suggested by the combination of Smith and Zweben, as discussed above with respect to claim 24.

For at least the above stated reasons, Applicant submits that independent claims 24 and 27, as well as claims 26, 28-29, and 31-34 which depend from claims 24 and 27, are in condition for allowance.

Conclusions

In light of these remarks and amendments, it is believed that claims 24, 26-29 and 31-34 are now in condition for allowance and allowance is respectfully requested. The Examiner is encouraged to contact the undersigned if minor amendments are needed in the figures, specification, or claims to bring this case into allowance.

Respectfully submitted,

By: _____

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